IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

YOSHIDA ET AL. Atty. Ref.: 1417-522; Confirmation No. 1323

Appl. No. 10/563,299 TC/A.U. 1787

Filed: June 1, 2006 Examiner: Freeman

For: GAS-BARRIER LAMINATE

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

EVIDENTIARY DECLARATION OF CHIHARU OKAWARA

I, Chiharu OKAWARA, hereby state and declare as follows:

1. That I am a citizen of Japan, and a postal address of c/o Mitsubishi Plastics, Inc., 5-2, Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan.

2. That I graduated from College of Natural Science, University of Tsukuba in March, 1988 and The Graduate School of Science and Technology Studies, University of Tsukuba in March, 1990.

3. That I was an employee of Mitsubishi Chemical Corporation from April 1990 to January 2003 and have been an employee of Mitsubishi Plastics, Inc., the assignee of this application, since February 2003, and have been engaged in the study of gas-barrier films.

4. That I am one of the inventors of U.S. Patent Application, Serial No. 10/563,299, the "subject application".

5. That I have read the Office Action dated October 1, 2010 and have understood the Examiner's rejection of the invention claimed in the above application and that under my control, the following experiments were conducted.

Experiment 1

The same procedure as described in Example 1 of the subject application was conducted except that the coating material for forming the polyester-based resin layer did not contain 2 parts by weight of stearamide. A gas-barrier laminate and a gas-barrier film were prepared and evaluated for the following properties: oxygen permeability (cc/m^2·24h·atm), adhesion strength (g/15 mm), transferring property and anti-blocking property using the methods described in the present application. The results are shown in Table 1.

In addition to the evaluation described in the present specification, the following evaluation of resistance to solvents contained in printing ink was conducted. This evaluation shows the technical effect resulting from the addition of polyisocyanate (refer to page 17, first paragraph of the present application).

<Evaluation of resistance to solvents contained in printing ink>

On the coating surface of the gas-barrier laminate obtained in Experiment 1 (present experiment), Reference Example 1 and Example 1 (both described in the present application), methylethylketone was coated in a liquid thickness of 22.9 μm using a bar coater at room temperature. Methylethylketone is generally used as a solvent for printing ink and was also used in the evaluation of (4) Gradation printability in the present application as the printing ink solvent.

In this test, the gas-barrier laminate was placed with the methylethylketone coated surface facing upward on a glass slide using a double-stick tape to attach it. The thus-prepared test specimen was placed in a two-way wear tester (manufactured by Shinto Scientific Co., Ltd, type: 30S) and a cotton swab was attached to the tester in a direction vertical to the specimen. The cotton swab was scanned after 10 strokes on the methylethylketone coated surface under a load of 70g, scanning speed 1200 mm/min and scanning distance of 25 mm. After scanning, the middle point of the scanned surface was observed by a differential interference microscope at a magnification of X200. The resistance to solvents contained in printing ink was evaluated by the following criterion. The results are also shown in Table 1.

Good: when the abrasion area is less than 20% of the view angle.

Poor: when the abrasion area is not less than 20% of the view angle.

For convenience, the results of Example 1 and Reference Example 1 are included in the following table.

Table 1

Composition of coating material (parts by weight)	Experiment 1	Reference Example 1	Example 1
Polyester resin[1)]	100	100	100
Fatty amide (stearamide)	2	-	2
Polyisocyanate[1)] (amount to a hydroxyl equivalent of the polyester resin)	-	1.2 times	1.2 times
Oxygen permeability ($cc/m^2 \cdot 24h \cdot atm$)			
Before hydro-thermal treatment	1.3	2.3	1.3
After hydro-thermal Treatment	2.5	5.2	1.5
Adhesion strength (g/15 mm)			
Before hydro-thermal treatment	300	380	380
After hydro-thermal Treatment	100	180	150
Transferring property	C	B	B
Anti-blocking property	C	D	A
Resistance to solvents contained in printing ink	Poor	Good	Good

1) Tg: 55°C, Mw: 8000, Hydroxyl value: 15 mg KOH/g
2) "CORONATE L" produced by Nippon Polyurethane Co., Ltd.

6. Based upon the above experiments, as seen from the above and my experience with gas-barrier laminate, when there is no polyurethane in the coating material (Experiment 1), the adhesion strength was low (especially after hydro-thermal treatment), and both the transferring property and anti-blocking property were poor. Also, the resistance to solvents contained in printing ink was poor. When there is no fatty amide in the coating material (Reference Example 1), not only the anti-blocking property but also the oxygen permeability before and after hydro-thermal treatment are poor.

7. As seen from the above experiments and related data, using a coating layer containing a polyester-based resin, and both the fatty amide and polyisocyanate in the specific amounts in combination, even though the film is subjected to printing and retort treatments, it is possible to maintain excellent printability, in particular, gradation printability. The polyester-based resin layer is free from deterioration in its gas-barrier properties even when a printed layer is applied to it, and the polyester-based resin layer further exhibits excellent adhesion between the plastic substrate and the inorganic thin film.

8. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: Feb. 21, 2011

Chiharu Okawara

Chiharu OKAWARA